



The RESEARCH QUESTION is:

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The INDEPENDENT VARIABLE is:

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The DEPENDENT VARIABLE is:

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CONTROLLED VARIABLES are:

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The first thing the team needs to do to answer the research question is:

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I will help with this task by:

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Keywords to use while researching:


Date \_\_\_\_\_

After doing library research, I still need to find information on:

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Date \_\_\_\_\_

After doing background research (a review of the literature), the hypothesis I developed is:

If

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Then

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Information the team must consider before designing an experiment:

What, specifically, are we testing (changing, comparing):

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What, specifically, will we observe and measure? What units will we use?

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How many trials will we conduct?

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The graphic organizer can help plan our procedure:

<b>Steps</b> (What needs to be done)	<b>Details</b> (Materials, how much, how often, when, time, temperature)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

The STEP-BY-STEP PROCEDURE we will follow to conduct our experiment is:

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_
7. \_\_\_\_\_  
\_\_\_\_\_
8. \_\_\_\_\_  
\_\_\_\_\_
9. \_\_\_\_\_  
\_\_\_\_\_
10. \_\_\_\_\_  
\_\_\_\_\_

11. \_\_\_\_\_  
\_\_\_\_\_

12. \_\_\_\_\_  
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13. \_\_\_\_\_  
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14. \_\_\_\_\_  
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15. \_\_\_\_\_  
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16. \_\_\_\_\_  
\_\_\_\_\_

17. \_\_\_\_\_  
\_\_\_\_\_

18. \_\_\_\_\_  
\_\_\_\_\_

19. \_\_\_\_\_  
\_\_\_\_\_

20. \_\_\_\_\_  
\_\_\_\_\_

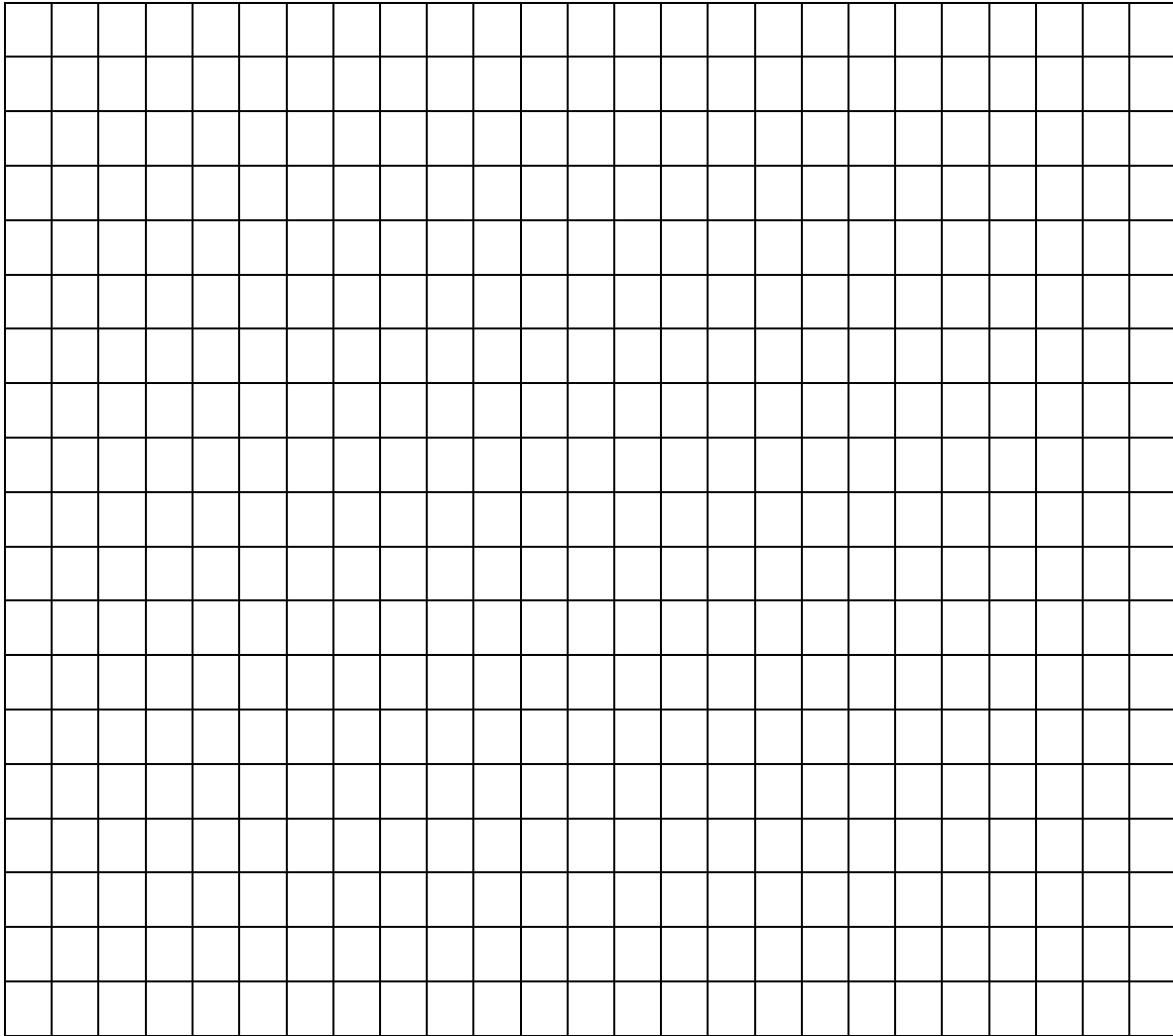
DIAGRAM of the experimental set-up:

The MATERIALS we will use are:

Material	What kind	How much

The DATA TABLE we will use to collect our data is:





After analyzing the data, relationships we found were:

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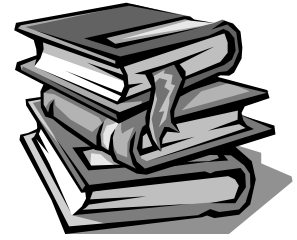


Guidelines

&

Instructions

## Background Information Literature Review



Background information or a literature review is a formal discussion of what is already known about your investigation topic. You spent several days researching in books, encyclopedias, magazines, and the Internet for information. This is called a Review of the Literature.

Take the bullet notes from the literature review and turn them into sentences and paragraphs.

- Begin with a topic sentence, and details and elaboration.
- Use transitions.
- Write the paragraphs just like you do in your English class.

Historical information about your topic is a good way to begin the literature review. If your topic is not one that is very well known or understood, then beginning with a definition of the subject might be the best way to introduce readers to your topic.

Background information does NOT include your question, procedure, or any other part of the investigation. It does include, historical information, scientists who made an impact in the field, definitions, drawings & diagrams, and anything that is currently known about any part of your topic.

The final copy of the background information must be at least **five paragraphs long**, double spaced, 12 point font. The only acceptable fonts are Bell Gothic, Arial, and Times New Roman.

Each person in the team will write his or her own background report.

One report for the group or one report turned in by everyone in the group will not be accepted.

## Hypothesis



The hypothesis is an educated guess. After doing background research, what is the expected outcome of the experiment? The hypothesis must show a reasonable relationship between the question and the predicted results.

A well-written question will allow you to write the hypothesis as an *If, Then* statement.

Remember:

If the *independent variable* changes [increases, decreases], then *dependent variable* will change [increase, decrease].

Be as specific as possible when describing the changes in variables.

A hypothesis is always supported with evidence from the literature review; explain *why* this is your hypothesis.

Begin a hypothesis with "It is hypothesized that If... then..."

## Procedure



The procedure is a numbered, step-by-step set of directions for conducting the experiment. The steps are sequential, easy to follow, and detailed. The procedure includes:

- What you are changing, testing, comparing [the independent variable]
- What you are measuring [the dependent variable]
- What you are using to measure the results
- How many times the experiment is being repeated or the number of subjects in the experiment – you must have a **MINIMUM** of five trials
- A diagram of the experimental set-up

## Materials List

The materials list is a list of everything used in the experiment. It is written in an unnumbered, list form. Include the amounts of each item, and brand names when appropriate.

# Data Table



Construct a chart to collect your data. A chart must show your independent variable and the number of trials. Totals or averages of all trials are shown in the chart.

Show your independent variable on the chart. Fill in the dependent variable [you data] as you conduct the investigation.

A chart must have a title. Show the unit(s) of measurement in the title.

## Sample Chart:

Title _____				
# of Trials	Specific Independent Variable 1	Specific Independent Variable 2	Specific Independent Variable 3	Specific Independent Variable 4
1				
2				
3				
4				
5				
Average				

# Data Analysis



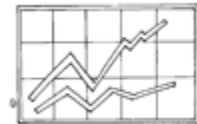
Look at your data; your charts and your graphs. Describe your data. Use appropriate measures of central tendency (mean, mode, range and frequency). Explain and discuss the patterns and relationships you see between the independent variable and the dependent variable.

**How does the independent variable affect the dependent variable?**

Discuss the accuracy of your data and where and why the data may be limited.

**The data analysis is one of the most important parts of any investigation. This is where you make sense of your results.**

# Graph



Look at your data. What is it you are going to want to tell a reader about your results? A comparison? A change?

Decide on the best kind of graph to use to show your data.

Draw your graph; include all appropriate labels and titles.

Make sure your units of measurement are part of each label.

## Conclusion



The conclusion is a discussion of what the data, patterns, and relationships mean. The conclusion answers the original question. It consists of **7 sections**. Each section is *at least one good paragraph* in length. Some sections may be longer.

- **Section 1** – describe the question and purpose, what was it you were trying to find out, and why?
- **Section 2** – state your hypothesis and whether or not the data collected during the experiment supported your hypothesis. The hypothesis is never right or wrong; it is either supported or not supported by the data. Use **specific data** to give evidence of the support of lack of support for the hypothesis. This means actual numbers [reduced] from your experiment must be discussed.
- **Section 3** – describe and discuss the most significant data.
- **Section 4** – describe and discuss any other or unusual observations made during the experiment.
- **Section 5** – evaluate the independent variable in terms of the results of the experiment. Did it make any difference? Why or why not? **Answer your original question.**
- **Section 6** - describe *applications* of your investigation; discuss the usefulness of the investigation. Describe several ways the results of the investigation could be helpful to another person. Who would want to know about these results and why? The applications must be related to the data and conclusion. Now that you have this information, what can be done with it?
- **Section 7** - describes ways that your investigation could be carried further or *expanded*. How could you elaborate on this topic? What else could be done?